

REMARKS

Applicant requests reconsideration of the present application in view of the discussion that follows. The status of the claims is as follows. Claims 22-39 were withdrawn from consideration and these claims were canceled previously without prejudice to Applicant's filing of divisional applications to what has been determined to be the separately patentable subject matter thereof. Claims 57 and 58 were previously canceled. The claims currently pending are claims 1-21, 40-56 and 59-62. No claims have been amended herein.

Summary of Main Arguments Regarding the Rejections under 35 U.S.C. §103

The following represents a summary of Applicant's main arguments, which are presented below in more detail. This summary does not include all of Applicant's arguments, which are set forth below.

1. The disclosure of Sharma is non-analogous to the disclosure of other references relied on for the rejection and, therefore, one skilled in the art would not look to Sharma for information relevant to the disclosure of these other references.
2. A *prima facie* case of obviousness has not been made with regard to the claim limitation that is directed to a chamber comprising a gas outlet in a wall thereof that is perpendicular to the gas inlets. Absent the teaching of Applicant, there is no reason for one skilled in the art, in view of general knowledge or the specific disclosures of the references, to choose the orientation as presently claimed from the numerous orientations of the nozzle disclosed in Narayanswami.
3. Substituting a pulse jet device for the nozzles of Wagener would not teach or suggest each and every element of claims 7 and 40, which require both a gas inlet and a drop dispensing device. Thus, the combined teachings would lack one or the other of the above elements.
4. The combined teachings of the references do not disclose or suggest the feature of claims 8 and 41 wherein each gas inlet is in fluid communication with a gas inlet source that is oriented to provide gas from two directions so that gas from each direction collides and enters the gas inlet in a direction that is substantially normal to the direction in which the gas flows through the gas inlets and enters the manifold. Moriya discloses nothing more than a branched supply line where one or more gases flow out of containers to a single line that leads to a reaction chamber.

Rejection under 35 U.S.C. §103

Claims 1-3, 5, 7, 9, 10, 12-20 and 40 were rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener, *et al.* (U.S. Patent No. 6,251,195) (Wagener) in view of Sharma, *et al.* (U.S. Patent No. 5,195,888) (Sharma) and Narayanswami, *et al.* (U.S. Patent No. 5,810,942) (Narayanswami).

The Office Action acknowledges that Wagener is silent as to the "diffuser 32" of the reference comprising a manifold including at least two compartments, wherein each of the compartments is in fluid communication with a respective gas inlet and wherein a perforated element is in fluid communication with the manifold and substantially perpendicular to the gas inlets.

While the Office Action recognizes that Wagener does not teach or suggest the perforated element of claim 1, the Office Action refers to Sharma as teaching an apparatus for dispersing a gas as a multi-layer fluid curtain, wherein the apparatus comprises a manifold including at least two compartments, wherein each of the compartments is in fluid communication with a respective gas inlet. The Office Action further alleges that Sharma discloses a perforated element in fluid communication with the manifold and identifies each of emitting areas 20 and 26 comprising an "opening covered by a porous, permeable or perforated surface," (referring to column 4, lines 17-33 and 47-66, of the reference in support thereof). The Office Action further contends that the perforated element is substantially perpendicular to the gas inlets 18 and 24 and refers to emitting area 26 as perpendicular to inlet 24 in FIG. 1. Also, asserts the Office Action, emitting area 20 may be, "oriented to emit the inner layer of fluid parallel to the furnace opening 10," thereby suggesting that the element may also be configured perpendicular to the gas inlet 18.

The Office Action contends that it would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the apparatus for dispersing gas of Sharma for the diffuser 32 in the apparatus of Wagener, on the basis of suitability for the intended use, because the fluid curtain as emitted by the apparatus of Sharma possesses two layers that act cooperatively to stabilize the laminar flow in each layer over a longer distance, thereby extending the effective area of coverage of the layers (referring to column 2, lines 41-50, of Sharma). Also, asserts the Office Action, the substitution of known equivalent structures involves only ordinary skill in the art.

First, Sharma is concerned with furnaces such as a metal melting furnace, e.g., an electric induction furnace. Although the patentee indicates that the invention has many applications for providing a selected atmosphere within a contained volume, the disclosure of the reference does not extend beyond metal melting furnaces. One skilled in the art, in developing improvements on an apparatus for transferring a microelectronic device to and from a processing chamber and the use of cryogenic fluids in the processing chamber such as disclosed by Wagener would not look to Sharma for relevant information.

Second, assuming for the sake of argument, that the skilled artisan would look to Sharma, an assumption that Applicant does not accept, the resulting combination of teachings does not yield the presently claimed invention. Neither of the references discloses or suggests, either individually or in combination, the feature of claim 1 where the chamber comprises a gas outlet in a wall thereof that is perpendicular to the gas inlets. Wagener employs a vacuum pump 40 and an equalization port 48 to control the environment of his chamber, which the patentee refers to as having a sealable interior space 14. Sharma is also silent on such a feature. Sharma shows only furnace opening 10 that is not in a wall that is perpendicular to fluid inlet 24.

Furthermore, the contention in the Office Action that emitting area 20 may be, "oriented to emit the inner layer of fluid parallel to the furnace opening 10," thereby suggesting that the element may also be configured perpendicular to the gas inlet 18, is not persuasive. As a matter of fact, Sharma states that the inner diffuser 16 may be oriented to emit the inner layer of fluid parallel to the furnace opening 10 or the inner diffuser 16 may be oriented to direct the layer into the furnace opening 10 and states further that, in FIG. 1, the porous faces 20 of inner diffusers 16 are oriented to emit fluid layers into the opening 10, and Sharma further states that an acute angle of up to 30 degrees into the opening is useful. Such an angle disclosed in the reference is not suggestive of a substantially perpendicular relationship.

Another point is that the substitution of elements asserted in the Office Action goes beyond the mere substitution of one element for another element. One skilled in the art would have to carry out undue experimentation in order to try to operably incorporate a diffuser such as taught in Sharma into the apparatus of Wagener. There is nothing in either reference that would assist the skilled artisan in making the substitution of elements as asserted in the Office Action.

The Office Action responded to Applicant's argument that one skilled in the art would not look to Sharma for information relevant to semiconductor processing chambers because Sharma is concerned with furnaces such as a metal melting furnaces by citing *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). The Office Action contends that *In re Oetiker* held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. Thus, asserts the Office Action, although Sharma and Wagener utilize gas curtains in different applications, both Sharma and Wagener are concerned with the same problem of providing an evenly distributed flow of gas.

In *In re Oetiker*, the patent involved an improvement in a metal hose clamp having a preassembly hook that was used to maintain the preassembly condition of the clamp and that was disengaged automatically when the clamp was tightened. The Examiner in that application cited a combination of two references to support the rejection of obviousness. The first reference related to a metal hose clamp without the hook, and the second reference described a plastic hook and eye fastener used in garments. The Federal Circuit held that the second reference was non-analogous art and, therefore, reversed the obviousness rejection.

The Federal Circuit stated (*Id.*, 24 USPQ 2d at 1446) as follows:

It has not been shown that a person of ordinary skill, seeking to solve a problem of fastening a hose clamp, would reasonably be expected or motivated to look to fasteners for garments. The combination of elements from non-analogous sources, in a manner that reconstructs the applicant's invention only with the benefit of hindsight, is insufficient to present a prima facie case of obviousness. There must be some reason, suggestion, or motivation found in the prior art whereby a person of ordinary skill in the field of the invention would make the combination. That knowledge can not come from applicant's invention itself.

In the present situation, gas flow in furnaces is even less analogous to gas flow in semiconductor processing chambers utilizing cryogenic fluids than fastening a hose clamp is to fasteners for garments. Accordingly, on that basis alone, Wagener and Sharma are not combinable in view of *In re Oetiker* because the references are concerned with non-analogous art. Applicant submits that, without the benefit of the Applicant's disclosure, there would be no motivation for the skilled artisan to combine the teachings of the references in the manner suggested in the Office Action.

The Federal Circuit also stated (Id., 24 USPQ 2d at 1446) as follows when determining whether a reference is within the inventor's endeavor:

We have reminded ourselves and the PTO that it is necessary to consider "the reality of the circumstances"-in other words, common sense- in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor.

In the present situation, Applicant submits that both the non-analogous nature of the reference disclosures and common sense support the proposition that one skilled in the art, in developing improvements on an apparatus for transferring a microelectronic device to and from a processing chamber and the use of cryogenic fluids in the processing chamber such as disclosed by Wagener, would not look to Sharma, who is concerned with metal melting furnaces, for relevant information.

In response to Applicant's previous arguments as set forth above, the present Office Action merely repeats its previous assertions regarding *In re Oetiker* contending that, although the references utilize gas curtains in different applications, both of the references are concerned with the same problem of providing an evenly distributed flow of gas in the form of a gas curtain. The present Office Action did not address any of the points set forth above and in Applicant's previous response regarding the fact that the holding in *In re Oetiker* actually supports Applicant's position that one skilled in the art, on the basis of non-analogous art and common sense, would not look to Sharma for information relevant to Wagener.

Applicant submits that, although in the fact situation of *In re Oetiker* both references dealt with the same problem of fasteners, the holding in that case was that the references were non-analogous art and, therefore, not combinable. Applicant further submits that the same is true in the present factual circumstances where the only connection between the references offered in the Office Action is that both references are concerned with gas flow.

The Office Action further contends that, in view of the newly added limitations, Wagener discloses a gas outlet (i.e., leading to vacuum pump 40; FIG. 1) in a wall of chamber 12. The Office Action acknowledges that Wagener, however, is silent as to the gas outlet being located in a wall of chamber 12 where the wall is perpendicular to the gas inlets.

It would have been obvious for one of ordinary skill in the art at the time the invention was made, asserts the Office Action, to shift the location of the gas outlet, with respect to the gas inlets, according to the instantly claimed configuration in the modified apparatus of Wagener, on the basis of suitability for the intended use and absent showing any unexpected results thereof, because the shifting location of parts was held to have been obvious. This is evidenced, alleges the Office Action, by Wagener, who discloses that, "Diffuser 32 can be positioned in a number of locations within chamber 12 as may be desired for a particular application," (referring to column 6, lines 34-36). The Office Action further asserts that Wagener cites a commonly assigned U.S. Patent No. 5,810,942 to Narayanswami (referring to column 6, lines 43-46, thereof), wherein the gas outlet (i.e., at exhaust duct 20) is positioned at a wall perpendicular to the gas flow, and hence, contends the Office Action, gas inlets (referring to FIGS. 3, 4 of the reference).

First, Applicant does not understand the comment in the Office Action referring to "newly added limitations." In Applicant's previous response, only one claim, namely, claim 8, was amended. Claim 8 is not among the claims rejected above. None of the other claims was amended. Therefore, Applicant respectfully requests clarification of this comment in the Office Action.

Second, the combination of Narayanswami with Wagener and Sharma does not produce the presently claimed invention. The aerosol nozzle in Narayanswami comprises a plurality of openings that emit aerosol in several directions. Referring to Fig. 3, and the corresponding text of the reference, Narayanswami discloses at least three different directions for the flow of aerosol. Accordingly, combining the teaching of Narayanswami with Wagener and Sharma would yield an apparatus where the gas outlets would comprise a plurality of openings oriented in all directions to produce gas flow in multiple directions. In the present claims the gas outlet is substantially perpendicular to the gas inlet so that a flow of gas is obtained that is substantially perpendicular to the wall comprising the gas outlet.

The Office Action responds to Applicant's arguments by maintaining that the "shifting of the location of parts" is knowledge generally available to those skilled in the art. In support of this proposition, the Office Action refers to Wagener as teaching that the diffuser location may be shifted, depending on a particular application (referring to column 6, lines 34-36). However, this disclosure by Wagener does not

disclose or suggest anything relevant to the position of the gas inlet in the present claims; Wagener's disclosure relates only to the diffuser location in his apparatus.

The Office Action further notes that Narayanswami was merely relied upon to illustrate that it is known in the art to shift the location of the gas outlet to the wall perpendicular to the gas flow device (as allegedly shown in Figs. 3 and 4) and not for a substitution of the specific nozzle of Narayanswami for the gas-dispersing device in the modified apparatus of Wagener. The test for obviousness, contends the Office Action, is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, asserts the Office Action, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art (referring to *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981)).

As Applicant indicated above, the aerosol nozzle in Narayanswami comprises a plurality of openings that emit aerosol in numerous directions. The Office Action's contention is that one skilled in the art would orient the gas nozzle of the reference such that it would emit aerosol in a direction as presently claimed, namely, where the gas outlet is substantially perpendicular to the gas inlet so that a flow of gas is obtained that is substantially perpendicular to the wall comprising the gas outlet. Absent the teaching of Applicant, there is no reason for one skilled in the art, in view of general knowledge or the specific disclosure of the references, to choose the orientation as presently claimed from the multitude of orientations presented in the reference. There is no "blaze mark," which the court has required to direct the skilled artisan in the selection process (see *In re Ruschig*, 379 F.2d 990, 154 U.S.P.Q. 118 (C.C.P.A. 1967)). The location of the gas inlet and gas outlet in the present apparatus assists in providing for atmospheric control in Applicant's apparatus. Applicant indicates in the specification that gas flow, which is substantially perpendicular to the wall of the chamber comprising the gas outlet, does not stagnate or recirculate (page 16, last sentence, for example).

In order to maintain a rejection under 35 U.S.C. §103 an examiner must first establish a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988); *In re Piasecki*, 745 F.2d 1468, 223 U.S.P.Q. 785 (Fed. Cir. 1984). In determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings

would appear to be sufficient for one of ordinary skill in the relevant art having the references before him to make the proposed substitution, combination or other modification. *In re Lintner*, 458 F.2d 1013, 173 U.S.P.Q. 560 (C.C.P.A. 1972). In asserting a *prima facie* case of obviousness involving more than one reference, the Examiner must show some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references offered by the Examiner as evidence of obviousness. *In re Lalu*, 747 F.2d 703; 223 U.S.P.Q. 1257 (Fed. Cir. 1984). In determining the scope and content of the prior art, references must be considered in their entirety, as a whole, including portions that would lead away from the claimed invention. *In re Panduit*, 810 F.2d 1561, 1 U.S.P.Q.2d 1593 (Fed Cir. 1987). Hindsight reconstruction using the disclosure and claims in prosecution as a guide to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention is not permitted. *In re Fine, supra*.

In the present situation, Applicant reiterates his position that it is only hindsight reconstruction of the disclosures of the references, and, in particular, of the disclosure regarding the aerosol nozzles of Narayanswami, that would enable the skilled artisan to choose, from the multitude of directions in which the nozzle of the reference emits, the direction and orientation as presently claimed. The physical incorporation of the nozzles of Narayanswami into the apparatus of Wagener and Sharma is not Applicant's issue. Applicant submits that picking the orientation of the present claims over other orientations disclosed in the reference is not supported in any of the references and is not merely a matter of choice for the skilled artisan. The Office Action asserts that the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. Applicant submits that, absence a teaching to the contrary, the skill artisan would have no reason to choose any specific orientation of a nozzle of Narayanswami from among the other orientations disclosed therein.

Claims 2 and 3 depend from claim 1 and, thus, are patentable over the combined teachings of the references by virtue of their respective dependency from claim 1, which is patentable over the references as demonstrated above.

The Office Action asserts that, with respect to claim 5, Wagener discloses that diffuser 32 can be positioned in a number of locations within chamber 12 as may be desired for a particular application and that diffuser 32 may be adjustably mounted

within the chamber 12. Thus, contends the Office Action, it would have been obvious for one of ordinary skill in the art at the time the invention was made to locate the diffuser opposite the opening 28 in the modified apparatus of Wegner on the basis of suitability for the intended use. Furthermore, argues the Office Action, the shifting of location of parts merely involves routine skill in the art.

Applicant respectfully traverses this rejection. Applicant indicates in the specification that gas flow, which is substantially perpendicular to the wall of the chamber comprising the gas outlet, does not stagnate or recirculate (page 16, last sentence, for example). This substantially perpendicular flow is realized by the structural relationship of the elements of the present apparatus. Therefore, the direction of gas flow in the present apparatus that is obtained by the relationship of the recited elements involves more than mere routine skill in the art.

Regarding claims 7 and 40, the Office Action contends that device 20 for dispensing reagents 24 is a drop dispensing device and that device 20 also comprises a pulse jet device since the device is capable of supplying a jet of cryogenic particles. Such a contention is unsupported by any reference. Device 20 of the reference is not a pulse jet device simply because device 20 supplies a jet of cryogenic particles. The Office Action further asserts that, in any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a known, suitable dispensing device for the device 20 in the modified apparatus of Wagener on the basis of suitability for the intended use and takes "Official Notice" that the instantly claimed dispensing devices are conventionally known in the art.

The issue is not whether such devices are known in the art. Applicant submits that one skilled in the art would not be inclined to substitute a pulse jet device for the aerosol device of Wagener. A pulse jet device would not function in the manner necessary for Wagener's apparatus to work properly because Wagener requires an aerosol spray, not pulsed drops of fluid.

The Office Action did not specifically address the above arguments. The Office action contends that, in any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a known, suitable dispensing device for the device 20 in the modified apparatus of Wagener, on the basis of suitability for the intended use, because "... the design of such nozzles and other devices and controlling techniques are known... Any known or developed

nozzle, supply or controlling circuits and mechanisms can be utilized in accordance with the process chamber of the present invention." (referring to column 5, lines 58-67, of Wagener).

It is readily apparent that the patentee, at the cited passage, is discussing the "process chamber of the present invention," which is one that requires an aerosol spray. In the passage referred to in the Office Action, Wagener is referring to the manner of creating an aerosol spray; there is nothing in the reference that indicates that the nozzles can produce something other than an aerosol spray. As mentioned above, a pulse jet device would not function in the manner necessary for Wagener's apparatus to work properly because Wagener requires an aerosol spray, not pulsed drops of fluid.

Furthermore, if a pulse jet device replaced the nozzles of Wagener, the combined disclosure would not teach or suggest each and every element of the claims. Claims 7 and 40 require both a gas inlet and a drop dispensing device. If the nozzles of Wagener correspond to the gas inlet of the present claims, the pulse jet device, which the Office Action alleges is substituted for the nozzles, would be either the gas inlet of the present claims or the pulse jet device of the present claims. Thus, the combined teachings would lack one or the other of the above elements.

Without acquiescing in the position of the Office Action regarding claims 9, 10 and 12-20, these claims depend ultimately from claim 1 and, thus, are patentable over the combined teachings of the references by virtue of their respective dependency from claim 1, which is patentable over the references as demonstrated above.

Claim 4 was rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener in view of Sharma and Narayanswami, as applied to claim 1 above, and further in view of Vogel (U.S. Patent No. 5,590,537). Without acquiescing in the position of the Office Action, Applicant has demonstrated above that claim 1, from which claim 4 depends, is patentable over the combined teaching of Wagener and Sharma. Vogel does not cure the deficiencies of those references and, thus, claim 4 is patentable over the combined teachings of Wagener, Sharma and Vogel by virtue of its dependency from claim 1.

Claims 6 and 11 were rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener in view of Sharma and Narayanswami, as applied to Claim 1 above, and further in view of Yamamoto (JP 63-296845). Without acquiescing in the position

of the Office Action, Applicant has demonstrated above that claim 1, from which claims 6 and 11 depend, is patentable over the combined teaching of Wagener and Sharma. Yamamoto does not cure the deficiencies of those references and, thus, claims 6 and 11 are patentable over the combined teachings of Wagener, Sharma and Yamamoto by virtue of their dependency from claim 1. Furthermore, Yamamoto is concerned with whirlwind-type draft chambers and one skilled in the art would not look to Yamamoto for information relating to apparatus for providing an evenly distributed flow of gas as in Wagener or a laminar flow of fluid such as in Sharma (*In re Oetiker, supra*). This point was not controverted in the Office Action.

Claim 8 was rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener in view of Sharma and Narayanswami, as applied to claim 1 above, and further in view of Moriya, *et al.* (U.S. Patent No. 4,650,698) (Moriya).

The Office Action recognizes that the collective teaching of Wagener, Sharma and Narayanswami is silent as to the instantly claimed gas inlets comprising a T-junction. However, asserts the Office Action, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide such a configuration for the gas inlets in the modified apparatus of Wagener, on the basis of suitability for the intended use, because Moriya describes such T-junctions. The Office Action refers specifically to the supply of a plurality of gases 3, 4, 5 and 6 via single gas inlet in Fig. 1 of the Moriya reference.

Applicant respectfully traverses this ground of rejection. Without acquiescing in the arguments in the Office Action, claim 8 recites that each of the gas inlets comprises a separate T-junction such that gas enters each of the gas inlets in opposing directions, which directions are substantially normal to the direction in which gas exits the manifold. In this manner Applicant achieves a result wherein gas is introduced into the gas inlet from both sides of the junction in a manner such that the gas flow from each side is in opposition to slow the gas before it enters the gas inlet on its way to the compartments of the manifold. This enhances energy dissipation of the gas within the compartments of the manifold. The combined teachings of the references do not disclose or suggest such a feature; the junctions of Moriya in Fig. 1 or elsewhere in the reference do not provide for the opposing flow of gas entering each gas inlet where the directions are substantially normal to the direction in which gas exits the manifold. Moriya discloses nothing more than a branched supply line where one or more gases flow out of containers to a single line

that leads to a reaction chamber.

Claim 21 was rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener in view of Sharma and Narayanswami, as applied to claim 1 above, and further in view of Philipossian (U.S. Patent No. 5,064,367).

The Office Action recognizes that the collective teaching of Wagener, Sharma and Narayanswami is silent as to each compartment comprising an element for diffusing gas within the compartment. However, asserts the Office Action, Philipossian teaches a compartment (i.e., asserts the Office Action, tube 10) comprising a diffusing element (i.e., asserts the Office Action, as defined by filler 45, or insert 46). It would have been obvious for one of ordinary skill in the art at the time the invention was made, contends the Office Action, to provide a diffusing element within the compartments in the modified apparatus of Wagener, on the basis of suitability for the intended use, because the diffusing elements produce a conical nozzle that supplies a gas flow at faster velocities, following the flow streamlines, and avoids or minimizes recirculating gas cells; the amount of gas used in purging a tube with this configuration is reduced, and the time needed for thorough purging is also reduced.

Applicant respectfully traverses this ground of rejection. First, Sharma is concerned with furnaces such as a metal melting furnace, e.g., an electric induction furnace. Although the patentee indicates that the invention has many applications for providing a selected atmosphere within a contained volume, the disclosure of the reference does not extend beyond metal melting furnaces and is also non-analogous to Wagener and Narayanswami. One skilled in the art, in developing improvements on an apparatus for transferring a microelectronic device to and from a processing chamber and the use of cryogenic fluids in the processing chamber such as disclosed by Wagener would not look to Sharma or Philipossian for relevant information.

Second, claim 21 depends ultimately from claim 1, which is patentable over the combined teaching of Wagener, Sharma and Narayanswami as demonstrated above. Philipossian does not cure the deficiencies of those references and, thus, claim 21 is at least patentable over the combined teachings of Wagener, Sharma, Naryanswami and Philipossian by virtue of its dependency from claim 1.

Claims 41, 43, 45-48 and 50-52 were rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener in view of Sharma, Powers (U.S. Patent No. 5,965,048) and Moriya.

The Office Action presents essentially the same arguments for combining the teachings of Wagener and Sharma as presented for the rejection of claim 1 over Wagener and Sharma. These arguments were addressed above. The Office Action recognizes that the collective teaching of Wagener and Sharma is silent as to each gas inlet being in fluid communication with a gas inlet source that is oriented to provide gas in a direction that is substantially normal to the direction in which the gas flows through the gas inlet and enters the manifold. However, the Office Action refers to Powers as teaching an apparatus comprising plural gas inlets, wherein each gas inlet 64 is in fluid communication with a gas inlet source that is oriented to provide gas in a direction that is substantially normal to the direction in which the gas flows through the gas inlet and into the diffuser (i.e., asserts the Office Action, via conduit 44, which directs the gas flow in a direction normal to the flow of gas through gas inlets 64). It would have been obvious for one of ordinary skill in the art at the time the invention was made, contends the Office Action, to configure the gas inlets as instantly claimed because the configuration allows plural gas inlets to be fed by a single gas source, as taught by Powers.

The Office Action recognizes that the collective teachings of Wagener, Sharma and Powers is silent as to the gas being provided from two directions, such that the gas from each direction collides and enters the gas inlet in a direction that is substantially normal to the direction in which the gas flows through the gas inlets and enters the manifold. In any event, asserts the Office Action, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide such a configuration for the gas inlets in the modified apparatus of Wagener, on the basis of suitability for the intended use thereof, because the provision of a T-junction at a gas inlet is conventionally known in the art of fluid distribution for enabling the supply of multiple gases to a single gas inlet, as evidenced by Moriya (i.e., for the supply of a plurality of gases 3, 4, 5 and 6 via a single gas inlet; referring to FIG. 1).

First, Sharma is non-analogous art as discussed above. Second, claim 41 recites that each gas inlet is in fluid communication with a gas inlet source that is oriented to provide gas from two directions so that gas from each direction collides

and enters the gas inlet in a direction that is substantially normal to the direction in which the gas flows through the gas inlets and enters the manifold. Therefore, even if the combination of teachings of Wagener, Sharma, Powers and Moriya were made as alleged in the Office Action, one still would not be in possession of the apparatus of claim 41. None of the references teaches or suggests the type of gas inlet that provides gas from two directions so that gas from each direction collides and enters the gas inlet in a direction that is substantially normal to the direction in which the gas flows through the gas inlets. Whatever the nature of conduit 44 of Powers, it is evident that it is incapable of functioning as required in claim 41.

This is also true for the gas conduits of Moriya. As discussed above, claim 41 recites that each gas inlet is in fluid communication with a gas inlet source that is oriented to provide gas from two directions so that gas from each direction collides and enters the gas inlet in a direction that is substantially normal to the direction in which the gas flows through the gas inlets and enters the manifold. In this manner Applicant achieves a result wherein gas is introduced into the gas inlet from both sides of the junction in such a manner that the gas flow from each side is in opposition to slow the gas before it enters the gas inlet on its way to the compartments of the manifold. This enhances energy dissipation of the gas within the compartments of the manifold. The combined teachings of the references do not disclose or suggest such a feature; the junctions of Moriya do not provide for the opposing flow of gas entering each gas inlet. Moriya discloses nothing more than a branched supply line where one or more gases flow out of containers to a single line that leads to a reaction chamber. There is no opposing flow of gas entering the gas inlet of claim 41 and exiting in a direction normal thereto.

The Office Action asserts that, with respect to Claim 43, Wagener discloses that diffuser 32 can be positioned in a number of locations within chamber 12 as may be desired for a particular application and that diffuser 32 may be adjustably mounted within the chamber 12. Thus, contends the Office Action, it would have been obvious for one of ordinary skill in the art at the time the invention was made to locate the perforated element opposite the opening 28 in the modified apparatus of Wegner on the basis of suitability for the intended use. Furthermore, argues the Office Action, the shifting of location of parts merely involves routine skill in the art.

Applicant respectfully traverses this rejection. Applicant points out in the specification that gas flow, which is substantially perpendicular to the wall of the

chamber comprising the gas outlet, does not stagnate or recirculate (page 16, last sentence, for example). This substantially perpendicular flow is realized by the structural relationship of the elements of the present apparatus. Therefore, the direction of gas flow in the present apparatus that is obtained by the relationship of the recited elements involves more than mere routine skill in the art.

With regard to the rejection of claims 45-47, the Office Action appears to be making essentially the same arguments as those presented in the rejection of claims 7 and 40. The Office Action contends that device 20 of Wagener for dispensing reagents 24 is a drop dispensing device and that device 20 also comprises a pulse jet device since the device is capable of supplying a jet of cryogenic particles. Such a contention is unsupported by any reference. The fact that device 20 supplies a jet of cryogenic particles does not make device 20 a pulse jet device. Applicant additionally refers to the arguments above with regard to the rejection of claims 7 and 40.

The Office Action further asserts that, in any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a known, suitable dispensing device for the device 20 in the modified apparatus of Wagener on the basis of suitability for the intended use, and the Office Action takes "Official Notice" that the instantly claimed dispensing devices are conventionally known in the art.

The issue is not whether such devices are known in the art. Applicant submits that one skilled in the art would not be inclined to substitute a pulse jet device for the aerosol device of Wagener. A pulse jet device would not function in the manner necessary for Wagener's apparatus to work properly because Wagener requires an aerosol spray. In addition, even if the nozzles of Wagener were replaced by a pulse jet device, the combined disclosure would not teach or suggest each and every element of the claims. Claims 45-47 require both a gas inlet and a drop dispensing device. If the nozzles of Wagener correspond to the gas inlet of the present claims, the pulse jet device, which the Office Action alleges is substituted for the nozzles, would be either the gas inlet of the present claims or the pulse jet device of the present claims. Thus, the combined teachings would lack one or the other of the above elements.

Without acquiescing in the position of the Office Action regarding claims 48 and 50-52, these claims depend ultimately from claim 41 and, thus, are patentable

over the combined teachings of the references by virtue of their respective dependency from claim 41, which is patentable over the references as demonstrated above.

Claim 42 was rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener in view of Sharma, Moriya and Powers, as applied to claim 41 above, and further in view of Vogel. Without acquiescing in the position of the Office Action, Applicant has demonstrated above that claim 41, from which Claim 42 depends, is patentable over the combined teaching of Wagener, Sharma, Moriya and Powers because the references are deficient in not teaching certain elements of claim 41. Vogel does not cure the deficiencies of those references and, thus, claim 42 is patentable over the combined teachings of Wagener, Sharma, Moriya, Powers and Vogel by virtue of its dependency from claim 41.

Claims 44 and 49 were rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener in view of Sharma, Powers and Moriya, as applied to claims 41 and 43 above, and further in view of Yamamoto. Without acquiescing in the position of the Office Action, Applicant has demonstrated above that claim 41, from which claims 44 and 49 depend, is patentable over the combined teaching of Wagener, Powers, Moriya and Sharma. Yamamoto does not cure the deficiencies of the combined teachings of those references and, thus, claims 44 and 49 are patentable over the combined teachings of Wagener, Sharma, Powers, Moriya and Yamamoto by virtue of their dependency from claim 41. Furthermore, as discussed above, Yamamoto is concerned with whirlwind-type draft chambers and one skilled in the art would not look to Yamamoto for information relating to apparatus for providing an evenly distributed flow of gas such as in Wagener or a laminar flow of fluid such as in Sharma.

Claim 53 was rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener in view of Sharma, Powers and Moriya, as applied to claim 41 above, and further in view of Philipossian. The Office Action recognizes that the collective teaching of Wagener, Sharma, Powers and Moriya is deficient as to each compartment comprising an element for diffusing gas within the compartment. However, asserts the Office Action, Philipossian teaches a compartment (i.e., contends the Office Action, tube 10) comprising a diffusing element (i.e., contends the Office Action, as defined by filler 45, or insert 46). It would have been obvious for one of ordinary skill in the art at the time the invention was made, contends the

Office Action, to provide a diffusing element within the compartments in the modified apparatus of Wagener, on the basis of suitability for the intended use, because the diffusing elements produce a conical nozzle that supplies a gas flow at faster velocities, following the flow streamlines, and avoids or minimizes recirculating gas cells; the amount of gas used in purging a tube with this configuration is reduced, and the time needed for thorough purging is also reduced.

Applicant respectfully traverses this ground of rejection. First, Sharma is non-analogous art. Second, claim 53 depends ultimately from claim 41, which is patentable over the combined teaching of Wagener, Sharma, Powers and Moriya, as demonstrated above. Philipossian does not cure the deficiencies of the combined teachings of those references with regard to claim 41 and, thus, claim 53 is patentable over the combined teachings of Wagener, Sharma, Powers, Moriya and Philipossian by virtue of its dependency from claim 41.

Claims 54, 55 and 59-62 were rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener in view of Sharma and Philipossian.

Regarding claim 54, the Office Action presents essentially the same arguments for combining the teachings of Wagener and Sharma as presented above with regard to the rejections of claims 1 and 41. The Office Action recognizes that the collective teaching of Wagener and Sharma is silent as to each of the compartments comprising raised surfaces within the compartments. However, asserts the Office Action, Philipossian teaches a compartment (i.e., contends the Office Action, tube 10) comprising raised surfaces (i.e., contends the Office Action, as defined by filler 45, or insert 46). It would have been obvious for one of ordinary skill in the art at the time the invention was made, concludes the Office Action, to provide raised surfaces within the compartments in the modified apparatus of Wagener, on the basis of suitability for the intended use, because the raised surfaces produce a conical nozzle that supplies a gas flow at faster velocities, following the flow streamlines, and avoids or minimizes recirculating gas cells; the amount of gas used in purging a tube with this configuration is reduced, and the time needed for thorough purging is also reduced.

Applicant respectfully traverses this ground of rejection. First, Sharma is non-analogous art as discussed above. Second, claim 54 recites a pulse jet device. None of the references discloses or suggests such a feature either individually or in combination. As discussed above, simply because device 20 of Wagener supplies a

jet of cryogenic particles does not mean that the device is a pulse jet device. Applicant submits that one skilled in the art would not be inclined to substitute a pulse jet device for the aerosol device of Wagener. A pulse jet device would not function in the manner necessary for Wagener's apparatus to work properly because Wagener requires an aerosol spray, not pulsed delivery of drops in a dropwise manner. Finally, even if the proposed substitution were made, the combined teachings would still lack one of claimed elements, namely, either a gas inlet or a pulse jet device.

The Office Action asserts that, in view of the newly added limitation, the modified apparatus of Wagener structurally meets the claim of a "pulse jet device", given that the device comprises a jet impingement nozzle 20 capable of being controlled to emit a jet of frozen cryogenic particles (see column 5, lines 43-67). Operation of the nozzle 20 in a pulsing manner is considered a process limitation. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Applicant respectfully traverses the above argument. It is clear from the disclosure of Wagener that the reference does not disclose a drop dispensing device. At column 5, lines 45-66, the patentee describes in detail that his nozzles are designed for dispensing an aerosol spray. This is not merely a disclosure of intended use. Likewise, a pulse jet device is one that is specifically designed for dispensing drops of liquid in a dropwise manner. The nozzles of Wagener that are designed for dispensing an aerosol spray are not capable of performing the dropwise delivery of liquid as with a pulse jet device.

Furthermore, even if the proposed substitution were made, the combined teachings of the references would still lack one of the claimed elements, namely, either a gas inlet or a pulse jet device.

Claim 55 is patentable over the combined teachings of Wagener, Sharma and Philipossian by virtue of its dependency from claim 54, which is patentable over the above references as discussed above.

Claims 59-62 are patentable over the combined teachings of Wagener, Sharma and Philipossian by virtue of their respective dependencies ultimately from claim 54, which is patentable over the above references as discussed above.

Claim 56 was rejected under 35 U.S.C. 103(a) as being unpatentable over Wagener in view of Sharma and Philipossian, as applied to claim 54 above, and further in view of Vogel. Without acquiescing in the position of the Office Action, Applicant has demonstrated above that claim 54, from which claim 56 depends, is patentable over the combined teachings of Wagener, Sharma and Philipossian because the combined teachings of the references is deficient in not including every element of claim 54. Vogel does not cure the deficiencies of those references and, thus, claim 56 is patentable over the combined teachings of Wagener, Sharma, Philipossian and Vogel by virtue of its dependency from claim 54.

Claims 1-3, 5, 7, 9, 10, 12, 13, 18-20 and 40 were rejected under 35 U.S.C. 103(a) as being unpatentable over Gamble, *et al.* (U.S. Patent No. 5,981,733) in view of Sharma. The Office Action acknowledges that Gamble is silent as to the gas outlet port 194 comprising a manifold including at least two compartments, wherein each of the compartments is in fluid communication with a respective gas inlet, wherein a perforated element is in fluid communication with said manifold, and wherein one or more elements for diffusing gas is located within each compartment.

While the Office Action recognizes that Gamble does not teach or suggest the above elements of claim 1, the Office Action refers to Sharma as teaching an apparatus for dispersing a gas as a multi-layer fluid curtain, wherein the apparatus comprises a manifold including at least two compartments, wherein each of the compartments is in fluid communication with a respective gas inlet. The Office Action further alleges that Sharma discloses a perforated element in fluid communication with the manifold and identifies each of emitting areas 20 and 26 comprising an "opening covered by a porous, permeable or perforated surface," (referring to column 4, lines 17-33 and 47-66, of the reference in support thereof). The Office Action further contends that the perforated element is substantially perpendicular to gas inlets 18 and 24 and refers to emitting area 26 as perpendicular to inlet 24 in Fig. 1. Also, asserts the Office Action, emitting area 20 may be, "oriented to emit the inner layer of fluid parallel to the furnace opening 10," thereby suggesting that the element may also be configured perpendicular to the gas inlet 18.

The Office Action contends that it would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute the apparatus for dispersing gas of Sharma for gas outlet port 194 in the apparatus of Gamble, on the basis of suitability for the intended use, because the fluid curtain as emitted by

the apparatus of Sharma possesses two layers that act cooperatively to stabilize the laminar flow in each layer over a longer distance, thereby extending the effective area of coverage of the layers (referring to column 2, lines 41-50, of the reference). Also, asserts the Office Action, the substitution of known equivalent structures involves only ordinary skill in the art.

First, Sharma is concerned with furnaces such as a metal melting furnace, e.g., an electric induction furnace. Although the patentee indicates that the invention has many applications for providing a selected atmosphere within a contained volume, the disclosure of the reference does not extend beyond metal melting furnaces. One skilled in the art, in developing improvements on an apparatus for the chemical synthesis of molecular arrays as disclosed by Gamble, would not look to Sharma for relevant information.

Second, neither of the references discloses or suggests, either individually or in combination, the feature of claim 1 where the chamber comprises a gas outlet in a wall thereof that is perpendicular to the gas inlets.

Furthermore, the contention in the Office Action that emitting area 20 may be, "oriented to emit the inner layer of fluid parallel to the furnace opening 10," thereby suggesting that the element may also be configured perpendicular to the gas inlet 18, is not persuasive. As a matter of fact, Sharma states that inner diffuser 16 may be oriented to emit the inner layer of fluid parallel to the furnace opening 10 or inner diffuser 16 may be oriented to direct the layer into the furnace opening 10 and states further that, in FIG. 1, the porous faces 20 of inner diffusers 16 are oriented to emit fluid layers into the opening 10, and further states that an acute angle of up to 30 degrees into the opening is useful. Such an angle disclosed in the reference is not suggestive of a substantially perpendicular relationship.

Another point is that neither of the references discloses or suggests, either individually or in combination, the features of claim 1 where a perforated element is substantially perpendicular to the gas inlets and where each of the compartments comprises one or more elements for diffusing a gas within the compartment.

Another point is that the substitution of elements asserted in the Office Action goes beyond the mere substitution of one element for another element. One skilled in the art would have to carry out undue experimentation in order to try to operably incorporate a diffuser such as that taught by Sharma in the apparatus of Gamble.

There is nothing in either reference that would assist the skilled artisan in making the substitution asserted in the Office Action.

The Office Action further contends that Gamble discloses a gas outlet (i.e., an exit port 196 to the atmosphere; FIG. 14) in a wall of the chamber 104. The Office Action recognizes that Gamble is silent as to the gas outlet 196 being located in a chamber wall that is perpendicular to the gas inlets (i.e., gas from dry gas port 194 enters through opening 140 in the wall of the chamber). In any event, asserts the Office Action, it would have been obvious for one of ordinary skill in the art at the time the invention was made to shift the location of the gas outlet, with respect to the gas inlets, according to the instantly claimed configuration in the modified apparatus of Gamble, on the basis of suitability for the intended use, because the shifting location of parts was held to have been obvious.

The assertions in the Office Action are not convincing. Dry gas port 194 is in a wall of a chamber that is a separate chamber from a chamber having a wall with outlet 196. Accordingly, not only is outlet 196 not in a relationship as presently claimed, namely, a gas outlet in a wall of the chamber where the wall is perpendicular to the gas inlets, but also the gas inlet 194 and outlet 196 of the reference are in separate chambers. Furthermore, the claim recites that the chamber has both (i) an opening in a wall thereof and (ii) a gas outlet in a wall thereof that is perpendicular to said gas inlets. Gamble does not disclose or suggest the above elements of the claim and Sharma does not cure this lack of disclosure or suggestion. The argument in the Office Action also is not persuasive in view of the teaching of Gamble with respect to his apparatus and the manner in which it is used, both of which are discussed above. It is only Applicant's disclosure that would provide the motivation to provide a gas outlet in a chamber wall that is perpendicular to a gas inlet.

The Office Action responded to Applicant's argument that one skilled in the art would not look to Sharma for information relevant to an apparatus for the chemical synthesis of molecular arrays as disclosed by Gamble because Sharma is concerned with furnaces such as a metal melting furnaces by citing *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). Applicant reiterates the discussion above with regard to the applicability of Sharma to Wagener. In the present situation, gas flow in furnaces is even less analogous to gas flow in apparatus for the chemical synthesis of molecular arrays than fastening a hose

clamp is to fasteners for garments. Accordingly, on that basis alone, Gamble and Sharma are not combinable in view of *In re Oetiker* because the references are concerned with non-analogous art.

In response to Applicant's previous arguments as set forth above, the present Office Action merely repeats its previous assertions regarding *In re Oetiker* contending that, although the references utilize gas curtains in different applications, both of the references are concerned with the same problem of providing an evenly distributed flow of gas to their respective chambers. The present Office Action did not address any of the points set forth above and in Applicant's previous response regarding the fact that the holding in *In re Oetiker* actually supports Applicant's position that one skilled in the art, on the basis of non-analogous art and common sense, would not look to Sharma for information relevant to Gamble.

Applicant submits that, although in the fact situation of *In re Oetiker* both references dealt with the same problem of fasteners, the holding in that case was that the references were non-analogous art and, therefore, not combinable. Applicant further submits that the same is true in the present factual circumstances where the only connection between the references offered in the Office Action is that both references are concerned with gas flow.

The Office Action responds to Applicant's arguments regarding the fact that the references do not teach or suggest a gas outlet being located in a wall of a chamber where the wall is perpendicular to the gas inlets by asserting that the "shifting of the location of parts" is knowledge generally available to those skilled in the art. Thus, asserts the Office Action, it would have been obvious for one of ordinary skill in the art at the time the invention was made to shift the location of the gas outlet, with respect to the gas inlets, according to the instantly claimed configuration in the modified apparatus of Gamble, on the basis of suitability for the intended use.

Without acquiescing in the position of the Office Action regarding claims 2, 3, 5, 7, 9, 10, 12, 13, 18-20 and 40, these claims depend ultimately from claim 1 and, thus, are patentable over the combined teachings of the references by virtue of their respective dependency ultimately from claim 1, which is patentable over the references as demonstrated above.

Conclusion

Claims 1-21, 40-56 and 59-62 satisfy the requirements of 35 U.S.C. §103.
Allowance of the above-identified patent application, it is submitted, is in order.

Respectfully submitted,



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